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Editorial

THE SEPTEMBER ISSUE of *Teaching* is to be a special one on the Teaching of Science.

It is hardly necessary to stress the importance of the subject in this scientific age. Not only is the child growing up in a world dominated by science, but to many of us science has become synonymous with material benefits. The young must therefore be instructed in this field of study so that they may understand and use its achievements wisely.

The making of scientists and technologists is the work of the universities. But secondary schools must, as a beginning, teach a scientific approach, for the teaching of science also promotes the growth of mental abilities such as observation, reflective thinking and problem solving.

While we leave the choice of subject open to contributors, we should like to remind them that the majority of secondary schools in India teach general science.

A few topics are suggested: motivation in science teaching; testing and evaluation; scientific terminology; methods in teaching a particular branch of science; the laboratory; the science club; special sciences compared with general science; the syllabus; audio-visual aids.

We fear that it has been necessary to shelve the proposed special issue on the teaching of Hindi as few contributions were received. If there is a revival of interest we shall resuscitate this proposal at a later date.

A Disciplined Study of Science

AS SOON AS CHILDREN are fairly proficient in reading and counting, they are full of curiosity about the world of nature, anxious to know how machines work, and why things happen as they do. Once their interest is engaged they will collect and tabulate facts without number. It is out of such curiosity and fact-finding that the disciplined study of science grows.

To observation and experiment, the teacher can add the facts derived from his own experiments, the knowledge of the work of painstaking or heroic scientists from the past, and so slowly the pupil can come to know something of the methods, discipline, and attitude of the scientist. In this, the understanding, through personal experience, of the value of scientific method, is of more far-reaching importance than the knowledge of scientific facts.

Scientific Method

Since the great creative outburst of experimental science in the seventeenth century, scientific studies have been pursued by a method and with a discipline that has grown particularly effective and creative in this century.

The basis of scientific method is the inductive method of reasoning. Experiment and observation lead to the collection of facts which generally display some regularities or pattern that can be clearly set out. The scientist then develops a hypothesis or theory to explain the existence of the orderly relationships detected. A scientific hypothesis is used as the basis on which to predict new facts. New experiments are therefore devised to test these predictions or, sometimes, to be critical experiments in the choice between rival hypotheses. If a hypothesis is sustained by these new experiments it will be formulated in the form of a law.

For example, during the nineteenth century a Kinetic Theory of Gases was formulated to explain the relationship, discovered earlier by Boyle and Charles, between the pressure, volume, and temperature of fixed masses of gas. Boyle's and Charles' Laws were then assumed to be universally valid and, as such, used to predict the course of future experiments. To be able to predict the future is to place yourself in the position to control it; and so the development of a great body of scientific law has given men great power over the vast forces of nature; as some would say, power in excess of their wisdom. Happily, scientists themselves are generally humble men, because they are constantly finding that even the most clear cut laws are imperfect. Thus in the twentieth century Charles' and Boyle's Laws have been found not to

apply at extremely low temperatures and so a new theory of gases has had to be developed.

Science and Imagination

Scientific advance has been due partly to the careful experiment and disciplined reasoning of scientists, but also (and this is sometimes forgotten) to the inspired imaginative and intuitive thinking of the really creative scientists. Einstein wrote: 'There is no logical way to the discovery of elementary laws. There is only the way of intuition; which is helped by the feeling of order behind the appearance.'

Great scientists have a capacity for inspired guessing and an intuitive ability of knowing what are the relevant and what the irrelevant facts. They set their minds consciously working on a problem and then out of the subconscious mind flow ideas that illuminate the whole scene. It is the combination of laborious and reasoned thought with flashes of imaginative insight that has enabled science to proceed so fast. The scientist needs to analyse and to simplify if his mind is not to be submerged by the richness of the external world, yet he also needs to see things in their totality.

Once, before I knew of Rumer Godden as a modern novelist of distinction, I bought one of her books to while away the tedium of a railway journey. As I looked at the title page I found myself wondering if the author were a man or a woman. So I thought I would play a game with myself. I would open the book at random, read the first paragraph on the right-hand page and then come to a decision as to the sex of the author, which might be checked by a more leisurely study. I did this and at the end of my reading of some dozen or so lines was in no doubt at all that the author was a woman. I was alone in the carriage, and so strong was my impression of a feminine point of view that it was almost as if there were a woman in the carriage saying the things written in the book. Yet there was no obvious clue in the words I had read. When I had confirmed my instantaneous impression, I looked very closely at the paragraph I had read and was able to prove to myself by a careful study of its phrases and a process of inductive reasoning that my previous conviction was correct and could be reinforced by the slower process of reasoned thought.

This trivial incident has often illustrated for me the fact that there are two paths to truth; the path of reason and the path of intuition. If we follow the path of reason we follow coherent, logical chains of thought step by step to a conclusion. From simple, self-evident truths the mind is able to proceed by means of chains of implicating inference to other more complex and less

evident truths. The intellect by its powers of analysis and synthesis is able from the confused totality of experience to pick out differences and to reunite them into new totalities that are more intelligible.

If we follow the path of intuition we exercise that power of mental insight by which the mind appreciates at once and in its totality some aspect of the external world, because there is something in our own personality that is like it. H. Bergson may have blurred too much the essential distinction between subject and object, but he defined this aspect of mental activity usefully as 'that kind of intellectual sympathy by which one places oneself within an object in order to coincide with what is unique in it and consequently inexpressible'. Analysis, on the contrary, is the operation which reduces the object to elements already known, that is to elements common both to it and to other objects. Reasoning, therefore, cannot reveal the truth about objects or people where these possess a large element of uniqueness. 'Consider any man,' says Bergson. 'Symbols and points of view, therefore, place one outside him; they give one only what he has in common with others, and not what belongs to him alone. But that which is properly himself, that which constitutes his essence, cannot be perceived from without, being internal by definition, nor be expressed by symbols, being incommensurable with everything else. Description, history, analysis leave us here in the relative. Coincidence with the person himself would alone give me the absolute.' (*Introduction to Metaphysics* by H. Bergson, 1912.)

In thinking, reason and intuition are usually combined; for the assumptions upon which deductive reasoning rests must be accepted as self-evident by intuition; and from the collection of data in inductive reasoning there must be an intuitive leap forward when a provisional hypothesis is formulated.

The external world is composed of a great many individual and particular objects, each one unique and having its own particular life-history. These are the two most striking characteristics of the external world—its particularity and its historical character. It is an individual world and it is always in the process of 'becoming'. Now science used not to be concerned so much with the unique particle and particular event, as with relationships between particular objects (such as atoms and molecules) and the 'order' which is therein revealed. And science is the least historical of studies. It seeks to discover the laws of nature in the sense of discovering those principles of order which are as true today as they were at the dawn of civilization. The law of gravity, for example, is not thought of as historical in any way. The verification of a law of

nature ought to be possible at any time by experiments that can be exactly reproduced at any point in history. In this sense, since it is concerned with relationships and with law, science is not concerned with the historical at all, but with timeless pattern.

Yet as soon as the scientist gets at one stage removed in his thinking from the particular and historical world revealed to him directly by his experiments, he enters the special field of scientific thinking; and this is the field of formal logic expressed in the language of mathematics; the language in which he states his eternal laws.

Science after the Renaissance

The growth of empirical science after the Renaissance added inductive thinking to deductive and so greatly enriched the character of abstract thought that science was able to proceed by the rhythmic alternation of inductive and deductive thought. Although arising out of observation and experiment, inductive thinking is no less abstract than deductive, for it rests on the principle of the uniformity of nature. Many particular instances are collected together, and then some hypothesis is intuitively framed which links the particular instance into an ordered whole of a universal character. The particular contribution of the Renaissance scientist was his insistence that science is an abstraction from the concrete reality of history. It is a simplified account of facts which, because they are individual and historical, for ever elude the grasp of science. The facts are true and so also are the scientific simplifications of them into laws, because these describe true relationships between them.

What makes the present period in scientific development so exciting is the fact that the creative impulses given to science at the Renaissance appear now to be coming to an end, and a new creative impulse to be coming in from a different direction. The Renaissance scientist went to nature, observed her, experimented, collected his facts, and then, using deductive-inductive logic, developed his conceptual thought and expressed it in mathematical symbolism. Today the link with the real world is being made from the opposite direction. The implications of mathematical symbolism are developed by deductive logic but not, as previously, to produce further abstraction, but to produce as end products (in the form of solutions to equations) the individual and the concrete. The scientist, from his equations, is forced to the conclusion that he has discovered the existence of a new particle or a new type of particle behaviour (i.e. a new piece of history). So he goes to the real world and contrives experiments, which may possibly reveal this new individual and historical world to him. Then comes the revelation. He actually finds in the sensible world the facts which his

equations tell are there, but of which he was previously completely ignorant.

Here then we see that a certain phase of scientific development has come full circle. The Renaissance scientists went back to nature, and as a result the logical and mathematical side of science received an immense impetus. Now from the extremity of mathematical abstraction we are being forced back to an examination of nature, in order to find there what our abstractions tell us must exist. The evidence for this is well known to all physicists and is particularly shown in the prediction of the existence of such particles as the neutron, the positron, and the meson and their subsequent observation in nature.

Visual Symbolism

At the beginning of the century scientists considered that they were investigating an inanimate nature external to their minds and divisible into pieces of matter enduring in time. They made use of a few simple concepts like length, mass, force, and time, which they thought were properties of external nature. It had not occurred to them that, for example, their concept of force might be a mental construct, projected on to nature from their own muscular experiences. Or consider the case of measuring. If a scientist said that a stick had a length of a foot, what he really meant was that he had taken a standard object, namely a foot-rule, laid it alongside the stick, so that he was able to observe 'simultaneously' the coincidence at each end of both stick and rule, and found a perfect matching. But the scientist was often not aware that his account of his experience was an account of experience and not of an external nature. What he said was, 'This stick has a length of one foot.' So scientists imagined they were examining nature when in fact they were examining an experience in which observer and observed were a part of a single system. Only slowly in this century have they become aware of this, and at the same time of the very far-reaching philosophic consequences of this discovery.

As this naive view of the natural world has changed, so also has the symbolism used by physicists. For many years physicists used a form of visual symbolism. Molecules were pictured as collections of billiard balls. Atoms were pictured as planetary systems and some scientists actually thought that their models were a kind of magnified picture of reality. But in time these models ceased to be so useful as a way of advance. Increasing use had to be made of mathematical symbolism for which there was no visual counterpart. And today mathematics has almost completely supplanted the visual model. Mathematical symbolism

is better than models for two reasons. In the first place, it can make use of more aspects of perception than the visual, e.g. it can use symbols for Time which is not a visually perceived reality. Then, secondly, it includes the results of reasoning, which is a mental process. This new use of mathematics assumes that scientific operations are concerned with observed matter and an observing mind, in a way which makes a complete separation between matter and mind impossible, or in other words, that matter may possess 'mind-like' qualities, and equally that mind may possess 'matter-like' qualities.

Art and literature seem to be more concerned with human experience than science, but this is only a matter of degree. After the brilliant period of advance in science by the Greeks, there was little further creative advance for two thousand years. Then came a large and accelerating pace of advance. Greek science stagnated partly because its philosophers forgot that their task was to make sense of 'experience', and not to explain the material world. Then at the Renaissance, creative spirits like Galileo paid no attention to the material world, for example to the weight of a body, but thought out Laws of Motion which would rationalize experience. One of the signs that we are near another period of renaissance is the fact that today scientists are leaving their materialism and returning to the rationalization of experience. Scientists no longer take the world of material objects as a necessary starting point, but go back to the experiences that led to the conception of that world for practical purposes, and group the experiences in a new way. This new emphasis on 'experience' rather than 'matter' links science more closely to literature and art than has been the case for many years.

Basil Fletcher

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Hindi as a Medium of Instruction

LANGUAGE has been called a world into which speechless animals have no entry, and from which human beings have no exit. Without speech the development and cultivation of mental faculties and the accumulation of human knowledge would not have been possible; therefore the story of language is the story of human civilization. It is through the instrument of language that the co-operation of human beings in civilized societies is possible. In the words of Emerson: 'Language is a city to which every human being has brought a stone.' In this sense the development of language is fundamentally democratic as distinct from the growth of literature, which is essentially the study of thoughts and experiences of particular individuals. As language is the main instrument of communication in a civilized society, it plays an important part in moulding our lives. As a medium of instruction it is even more important, as on it centre all processes of imparting knowledge.

Hindi as an Official Language (Rajya Bhasha)

According to the Linguistic Survey of India there exist 231 languages and 774 dialects in our country at present. Amongst these, as many as 116 dialects are minor tribal speeches belonging to the Tibeto-Chinese family; these dialects are spoken on the northern and north-eastern borders of India. Out of 231 languages the following 14 are mentioned in the Eighth Schedule of the Constitution of India: Kashmiri, Assamese, Bengali, Oriya, Punjabi, Gujarati, Marathi, Sanskrit, Kannada, Malayalam, Tamil, Telugu, Hindi and Urdu. Of these, although Hindi in the Devanagari script has been adopted for the official business of the Indian Union, languages other than Hindi are not neglected in the Constitution. So we can very well say that India has not one but fourteen national languages.

Why not the English Language?

It is argued that English is one of the foremost languages of the world having a rich cultural heritage, so why should there be a change in our medium of instruction? English has been spoken in India for about a hundred years, since the consolidation of British rule. Its vast and rich literature offers greater pleasures to students than any other language of the world. Again, English is the common medium of administration at higher levels in all the states of the Indian Union. Even today it is the language of our legislation, law courts, and universities. In the past it served as a medium for uniting the country in the formation and enforcement of national demands, and it still remains a common means of expression among the intelligentsia.

But this is no reason for it to continue as the common medium of expression. English is spoken and understood only by a few privileged people in our country. The following figures, based on the 1951 census, indicate literacy in English in the Indian Union:

1.	2.	3.	4.	5.
Population	*Literates*	*Literates in English*	*Col. 3 as a Percentage of col: 2*	*Percentage of literacy in English*
35,66,91,760	5,92,29,862	37,96,408	6.41	1.06

From this it is evident that the number of persons with some knowledge of the English language was only 38 lakhs out of 357 lakhs, or slightly more than one per cent, which is a negligible figure.

Secondly, however rich a foreign language may be, it is no substitute for a national language. In this connexion what Mahatma Gandhi said in 1916 is noteworthy: 'The foreign medium has caused brain fag, put an undue strain upon the nerves of our children, made them crammers and imitators, unfitted them for original work and thought, and disabled them for filtrating their learning to the family or the masses. The foreign medium has made our children practically foreigners in their own land. It is the greatest tragedy of the existing system. The foreign medium has prevented the growth of our vernaculars. If I had the powers of a despot, I would today stop the tuition of our boys and girls through a foreign medium, and require all the teachers and professors on pain of dismissal to introduce the change forthwith. I would not wait for the preparation of textbooks. They will follow the change. It is an evil that needs a summary remedy.'[1]

This observation today is supported by the majority of our leading educationists and men of affairs. One of them, in the course of his evidence before the Official Language Commission of the Government of India, stated that '. . . in spite of the fact that the English language was his language of thinking and his almost exclusive single linguistic tool of thought and expression, he still experienced traces of a handicap of a foreign medium of expression when engaged in consideration of abstruse and difficult concepts in his field of study.'[2]

There is no doubt that due to the domination of the English language for over a century the growth of the Indian languages has been completely suppressed. Also, the argument that scientific knowledge would not have been acquired without English does not hold good. If the educational policies of the British rulers had

[1] *Report of the Official Language Commission*, 1956, p. 90.
[2] ibid., p. 89.

been different, scientific and technical advancement would have come to India through the medium of our vernaculars, as has been the case with other countries whose medium of instruction is other than English.

Lastly, it has been emphasized by educationists that since Independence, the standard of English in schools and colleges has deteriorated. If this is true, then there is all the more reason why English should not be the common medium of expression, particularly as only a negligible proportion of the population is able to understand it. The Official Language Commission has already recommended that in the light of the fully democratic basis of Indian polity, it is not possible to envisage the English language as India's mass medium.

Hindi and the Regional Languages

When we speak of Hindi as a medium of instruction, it means that this medium can be applied to the Hindi areas of Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan and the Punjab without any difficulty, as Hindi is here the mother-tongue of the people. For already in Bihar and Uttar Pradesh Hindi has been declared the official language for the legislatures, judiciary, and for education in the universities. But the same formula cannot be applied to the non-Hindi regions.

Educationists agree that from the scholastic point of view one's mother-tongue is the best and most natural medium of instruction. Unfortunately, there has been a tendency to neglect the mother-tongue in India. This neglect would be aggravated if an attempt was made to introduce Hindi as a common medium of instruction in non-Hindi areas. Mahatma Gandhi, in expressing his views in favour of providing a place for the regional languages in free India, said: 'The medium of instruction should be altered at once and at any cost, the provincial languages being given their rightful place. I would prefer temporary chaos in higher education to the criminal waste that is daily accumulating. In order to enhance the status and the market-value of the provincial language, I would have the language of the law courts to be the language of the province where the court is situated. . . .' In our Constitution provision is made for adult franchise, free and compulsory education, and social justice, and equal opportunity and fundamental rights are guaranteed to all. These can be achieved only through the use of the mother-tongue.

The English language, which occupied a prominent place for so long, is now being rapidly replaced. Our regional languages should take its place. Provincial rivalries and the demand for independent linguistic states are clear indications in favour of the

regional languages in preference to Hindi or English. It has been argued that Hindi cannot become an effective medium at the university level so long as the regional languages continue to be the medium of instruction in the secondary schools. Also, the standard of teaching will deteriorate unless students are taught in a language they thoroughly understand. It is true that Hindi is spoken and understood by about 15 crores of people, that is, 42 per cent of the total population of India (according to the 1951 census). But what about the rest of the population who speak the languages of the Eighth Schedule of the Constitution and other minor languages? Would they wish to adopt Hindi at the cost of their mother-tongue? It is obvious they would not, and some have even favoured the retention of English as the common medium, as is the case in South India. Under these circumstances, it is necessary and desirable to develop all Indian languages and to provide them with full scope within their regions. It would be foolish to impose Hindi for administrative and educational purposes in non-Hindi areas.

The Importance of Hindi

Hindi has been adopted in the form of its *khari boli* in the Devanagari script in the Constitution for the official business of the Indian Union but not as a common all-India language (*antara bhasha*). It is stated in Article 351 of the Constitution: ' It shall be the duty of the Union to promote the spread of the Hindi language, to develop it so that it may serve as a medium of expression for all the elements of the composite culture of India and to secure its enrichment by assimilating, without interfering with its genius, the forms, style and expressions used in Hindustani and in the other languages of India specified in the Eighth Schedule, and by drawing, wherever necessary or desirable, for its vocabulary, primarily on Sanskrit and secondarily on other languages.'

It should be borne in mind that Hindi has been adopted for this purpose not because it is better developed than the other Indian languages or because it possesses a wealth of literature, or because more books on science and general education are available in this language. It has been selected as the official language medium simply because it happens to be understood and spoken by the largest number of people in our country.

Hindi films have proved a very powerful means of spreading the language in the non-Hindi areas, and it is interesting to note that the film industry is predominantly located in places outside the Hindi-speaking region. For example, out of approximately 300 films made every year in India, about 120 are made in Hindi and in Bombay. Figures for the year 1959 are as follows:

Assamese	5	Kannada	5	Oriya	2
Bengali	38	Malayalam	3	Punjabi	1
Hindi	121	Marathi	10	Tamil	78
				Telugu	46

Since the film is a very effective and forceful medium of expression, further efforts can be made through this medium to popularize Hindi in the non-Hindi areas. The number of books printed in the Hindi language is also increasing steadily. This may be because Hindi books have a bigger sale than those in other languages.

Hindi should be introduced gradually

If Hindi is to be popularized, its supporters should propagate their cause gradually. They should not be under the impression that by replacing English with Hindi they will be rendering a great service in bringing about unity in the country. After all, there cannot be any language dearer than one's own, and therefore it is not easy to sacrifice the mother-tongue. The people of the non-Hindi areas must be convinced of the importance of Hindi, and they must study it voluntarily. They should not feel for a moment that it is being thrust upon them, or that they must face ' Hindi imperialism '. Let us not consider Hindi as the language *par excellence* of India and in our enthusiasm raise the demon of communalism.

The Union and state governments have made considerable progress in popularizing Hindi in non-Hindi-speaking areas. The preparation of Hindi technical terms, textbooks and translations of works of literature has been undertaken. A scheme costing Rs 20 lakhs was drawn up by the Government of India for the development of modern Indian languages during the years 1958-61. The Sahitya Akademi, inaugurated in 1954, ' is a national organization to work actively for the development of Indian letters and to set high literary standards, to foster and coordinate literary activities in all the Indian languages and to promote through them all the cultural unity of the country '. The publication of a national bibliography of Indian literature, covering all books of literary merit published in the twentieth century in the fourteen languages mentioned in the Constitution, is one of the important tasks of the Akademi. In many non-Hindi-speaking areas, Hindi has been made a compulsory subject in secondary schools, and Hindi teachers' training colleges have been established. The compilation of a Hindi encyclopaedia is in progress. Hindi has been introduced as the language of state documents such as the warrant of appointment of governors and

high court judges. Medals which have been struck for various awards, both military and civil, bear Hindi inscriptions. Similarly, for ceremonies and state occasions, Hindi is being used to a large extent.

It is hoped that since Hindi has such great potentialities, it will be a powerful uniting force in the future.

J. C. JAIN

Geography—a Popular Subject?

THERE WAS A TIME when geography teaching required children to memorize long lists of towns, rivers and products of a country, or cut-and-dried definitions of volcanoes, capes, bays and other physical features of the landscape. The only apparatus used in the classroom was an old map or two, and occasionally a globe. The average school geography syllabus concentrated more on the 'technical' aspects of the subject, on physical, economic, or regional geography, and less on the human aspect of man in his natural environment. Treated as a collection of geographical data, geography proved a dull study and was deservedly one of the most unpopular and unrewarding subjects in the school curriculum.

The situation is, or at least should be, very different today, for the approach to and scope of geography has widened during the past fifty years to an extent perhaps unequalled by any other subject. On the technical side, where geography draws its subject-matter from kindred sciences such as geology and astronomy, the growth of knowledge has been impressive in its range and comprehensiveness. But still more impressive has been the rapid development of 'human geography', and the study of man in his natural environment has become the core and inspiration of modern geographical research. The result of this unprecedented development in geographical knowledge is a major reorganization of the geography syllabus in our schools. Up-to-date textbooks and reference books are rich in content and strive to do justice to the various aspects of the subject: physical, regional, economic and, last but not least, human. Furthermore the progressive teacher can command a wealth of apparatus and audio-visual teaching aids in the form of maps, charts, films and filmstrips, and radio broadcasts, which can help to make geography a fascinating subject for his pupils.

The Actual Position

In view of this minor revolution in content and method, an interested observer would be justified in expecting to find that geography is one of the most popular subjects in our schools, among both pupils and teachers. Actually, so far as the experience of this writer goes, the opposite is true. If a popularity poll of subjects were to be taken, it would certainly reveal that geography is one of the least popular subjects among both pupils and teachers. If this assessment of the current position of geography in the average school curriculum is correct, we must seek the reasons for the considerable gap between the potentialities and the realities of the teaching and learning of geography in our schools. Further we must seek a remedy for this manifestly unsatisfactory state of affairs. The author has puzzled over this problem for some time, and, as a result of his study of the actual position in certain schools, he has arrived at some tentative conclusions which he would like to share with his readers.

Poor learning and an unfavourable attitude to a particular subject in the curriculum are due either to poor teaching or to basic deficiencies and difficulties in the subject itself, or, more often, to a combination of both; for while a teacher who possesses real ability and enthusiasm can make even a dull subject interesting, the average teacher is usually as dull or as interesting as the subject he is teaching.

The author is convinced that, by and large, poor teaching is at the root of much of the apathy and aversion of the average pupil towards geography. But poor teaching is itself a function of many deep-seated causes which need to be unearthed if we are to penetrate to the heart of the problem. Why is the quality of geography teaching poor, especially in view of the fact that geography is an ideal teaching subject and should have a spontaneous and widespread appeal for pupils and teachers?

The answer is that most geography teachers are not academically qualified to teach the subject, especially at the high school level where a wide knowledge of the subject, at least up to the level of a first degree, is necessary for a teacher to do justice to the wide scope of a modern geography syllabus. The teacher is not to blame for this unsatisfactory state of affairs. Geography is a relative late-comer to the university field of studies, and while all universities permit students to offer geography for a degree or for post-graduate studies, very few affiliated colleges afford facilities for the study of geography up to a pass degree or up to an honours degree level. As a result relatively few students read geography

as one of their degree subjects, and, even of this few, only a handful enter the teaching profession. It is in fact next to impossible for all or even the majority of schools to obtain the services of a specialist who has a pass or honours degree in this subject, let alone a master's degree. Hence they are compelled to entrust the teaching of geography to those whose knowledge of the subject goes only as far as the Senior Cambridge or Intermediate level.

This standard might have been adequate twenty years ago, but it is totally inadequate today when the boundaries of geography have expanded in all directions, when the technical aspects of the subject are becoming increasingly scientific, and when human geography has evolved beyond reasonable expectation. It is true that the good teacher, even if he starts with a Senior Cambridge or Intermediate level of knowledge, can grow with his subject, so that in time he will possess the requisite background of academic knowledge to make his subject live.

While this is possible where the human aspect is concerned, it is not easy for a teacher with a poor foundation to keep pace with the technical and scientific aspects of geography, especially with the practical side, such as surveying, the reading and interpretation of ordnance maps, meteorological statistics, contours, and the comprehension of geological and oceanographic data. Hence the underqualified teacher often finds himself out of his depth when handling the more specialized aspects of a modern geography syllabus, and he has to rely almost entirely on the textbook. Since his own grasp of many of the topics is shallow, he cannot convey any real understanding or appreciation of them to his pupils. The study of geography in such circumstances has become once again a matter of committing to memory large chunks of the textbook without any clear understanding of what is being memorized.

Misleading Attitudes

What is broadly termed 'physical geography' is generally the worst taught and dullest part of the average geography course. But even regional and human geography suffer because few teachers are prepared to collect and pass on to their pupils up-to-date information about recent geographical developments which would make their lessons topical and significant. Here also they rely almost wholly on textbooks, and though these are periodically revised, they are often out of date on publication. In the field of economic and human geography, current newspapers, magazines, travel literature, films and filmstrips are a significant

and indispensable supplement to the textbook, but how few teachers make full use of them! As a result, they often teach facts, disseminate viewpoints and pass on attitudes to their pupils which are not only outdated but are false. To think of resurgent Africa in terms of pygmies, cannibals and fuzzy-wuzzies, or of industrially progressive Holland in terms of picturesque windmills and tulips, is obviously absurd. And, what is worse, even when learning about their own country the pupils are fed on information which may have been true in 1947 but is quite incorrect of the radically changing India of today. The concept of geography as a living and growing subject, whose data is being created afresh before our eyes, is often conspicuous by its absence.

The second reason for the unpopularity of this subject is that teachers do not make adequate use of the rich variety of aids and techniques which the modern theory and practice of geography teaching have placed at their disposal. As the writer has remarked earlier, the reading and explanation of the textbook and dictation of notes from it form the basis of the geography lesson. The teacher's aim is to pass on a body of facts which will be useful in the examinations. Maps, globes, sometimes a few pictures and an occasional model are the only teaching aids used. This is a great pity, for there exists a variety of modern methods and techniques of geography teaching, such as field surveys and local studies, visits to factories, dam sites and harbours, the making of models and relief maps, the use of 'resource persons', that is, visits from foreigners who can bring their countries into the classroom, the exchange of letters with 'far friends' in other countries, the collection of travel literature and its use for imaginary aerial journeys round the world, the utilization of well-chosen films and filmstrips, and the fitting up and use of a well-equipped geography-cum-history-cum-social studies room in which the correlation of geography with allied subjects can be exploited. Most teachers are taught these methods at training colleges, but few use them.

How can this sad state of affairs be remedied? Both a long-term and a short-term policy are necessary. In adopting a long-term policy, more colleges should introduce geography for graduate and post-graduate study, and students who propose to take up teaching as a profession should be encouraged to study the subject up to a degree standard. Training colleges and university departments of education will then be in a position to build upon this strong foundation of geographical knowledge.

A short-term approach to the problem should be adopted by state departments of education, universities, training colleges and

teachers' associations. These bodies should organize well planned refresher courses which would extend the knowledge and experience of the teachers and would bring that knowledge up to date.

Only by such a plan of action will present-day and future geography teachers be able to fully utilize the immense educational possibilities of geography in the school curriculum.

AUSTIN A. DE SOUZA

Design for a Social Studies Laboratory

THE SUBJECT OF SOCIAL STUDIES was brought into prominence by the Secondary Education Commission (Mudaliar Commission) in its report[1]. Introduction of the subject has, however, been accepted as a necessary reform in school academic programmes since the first draft on Basic Education, as early as 1937. Though nearly a quarter of a century has since elapsed, teachers are still not certain why the subject is taught, and much less are they able to evolve suitable methods and techniques to facilitate its teaching in their schools. The confusion may be due to the administrative measures adopted in certain states whereby the term 'social studies' is used for the grouping of marks obtained by pupils in examinations in history, geography and civics. The concept of social studies and the technique of teaching it, have, therefore, remained obscured and when people talk of social studies they mean the three subjects of history, geography and civics, and use this as a common term to describe the three subjects together. To add to the administrative difficulties, the universities persist in recognizing the subjects of history, geography and civics—the last only on sufferance—as separate units. Further, the concept of social studies is usually misunderstood by Indian teachers who have attended the special seminars, symposia and conferences of which experts from foreign countries occasionally have the privilege of serving as 'resource personnel', 'guides', or 'technical' advisers.

The object of this article therefore is to clarify what is meant by social studies, and to develop a design for a social studies laboratory, the use of which will help our secondary schools to function better as centres of education for democracy.

[1] *Report of the Secondary Education Commission* (October 1952 to June 1953), pp. 93-4.

Fundamental Values

Whatever may be the traditional facts of the case in other countries, one can say with assurance that teachers in India have for generations taught the fundamentals of social studies without being aware of the term. In ancient India knowledge and truth were considered indivisible. Literature, science, crafts and arts were included in the curriculum together with history, geography and civics. It was impossible to teach the history of India without inquiring about the fundamental principles of life. This process of finding the roots of our existence and understanding and explaining the values which we hold dear has been an age-old practice in India. This approach to old things as a pointer to new ways of life was developed through theoretical and practical work on the basis of eternal values. Social studies led to the study of social sciences and to social service. And educationists of today can improve on the older practices and methods with the help of modern knowledge and facilities.

Social studies have five fundamental values:

Truth (*Satyam*)	Duty (*Dharma*)	Love (*Prem*)
Sacrifice (*Tyag*)	Freedom (*Mukti* or *Swatantrya*)	

Human efforts to preserve these values form the basis of social studies.

Social progress studied historically can be related to these fundamental values, which in themselves serve as sources for detailed investigation. By the study of values a teacher can transform his subject from a mechanical piece of work into an absorbing one. As these values are universal, social studies need not be restricted to one curricular subject but can be related to many through exploration, observation, and experimentation.

Between these fundamental values and the human weaknesses that endanger them, individual differences play a very important part. So do the individual's basic needs, which give rise to a number of social institutions. For example:

food or nutrition	commissariat
reproduction	family
fear	protection
movement	transport
shelter	housing
physical health	medical services
mental health	religion, and places of worship

It is one of the important aims of social studies to trace the development of such basic needs to social institutions, and our teaching

can be illuminated by the lives of those who have served humanity. The search for truth goes on, and man delves into the ocean depths and penetrates the stratosphere. And he has matched these achievements in science with his powers of the spoken and the written word. The study of ' man in the making ' is eternally inspiring.

When we consider how the approach to social studies is misunderstood today, the preceding elaboration on the fundamental values is found justifiable. For some unknown reason, teachers concentrate on social studies only with reference to social mechanisms such as democratic committees, local parliaments, government and so on. In doing so they miss the vital link, and the study becomes uninteresting, rigid, at times wasteful of human energy. The social and cultural activities periods in schools are thus often valueless. The situation can, however, be partly remedied by the establishment of social studies laboratories in schools.

Teaching the Functions of Society

If we believe in scientific methods we need a place specially reserved for experiments, demonstrations, practice and observation in this subject, for a social studies laboratory must have exhibits, charts, diagrams, reference books, tools for measurement, audio-visual aids and, if possible, a workshop.

The social studies laboratory is a place where the functions of society are to be studied. If human values form the basic education of every child, these values must be experienced as well as taught. The functions of society can be simulated to a degree in a laboratory which is equipped with the following material:

Visual material: pictures, diagrams, maps, exhibits, models
Reference library: biographies, historical documents, tourist's guides
Tools: for measuring time, distance, area
Nutritional exhibits: canned products, agricultural produce grown in different climates by different peoples

These materials should be classified and grouped for easy and effective use.

It is worth while to prepare a list of workable projects in social studies, taking care to see that the projects cover the normal requirements of the school syllabus. These projects will be based on the fundamental principles and they can be called ' Projects in Fundamental Values '. Groups working on projects will be free to draw upon the social studies laboratory or to develop them through other means, and at the end of the school year these projects will be judged. To popularize them, grants should be donated

to needy schools. In schools where such donations are a regular annual feature the results are very inspiring. These schools have successfully motivated other schools to complete projects of even better standard, and they in their turn have helped many rural schools where new ideas are not easily adopted.

Although pupils can make aids and exhibits in the laboratory, social studies must also be related to immediate social surroundings. Excursions, social service projects, annual festivals, as well as a score of similar activities which schools undertake as part of a social and cultural programme, should be correlated with social studies. Many schools have science clubs and some schools have formed social study circles. Pupils' observation books are a great help to the teacher and to the pupils' own study group for such activities can be immensely enriched by data collected in observation books by various exploration parties. The spirit of exploration and adventure is evident among pupils, though they lack the wonderful facilities and opportunities available to members of the Outward Bound schools in Europe. The logical, scientific and purposeful integration of the school's curricular and extra-curricular activities will make work in the laboratory enjoyable and realistic.

Parent Participation and Other Problems

The occasional evaluation of school work is useful to parents, pupils, teachers, and departmental officers alike; but parents are the silent and most effective inspectors of school work. The best way of evaluating work in social studies is to hold an Assessment and Evaluation Day when parents should be invited to co-operate with the teachers in judging the work of the pupils. To make social studies a popular subject, teachers should make the workshop accessible to parents.

Schools which accept social studies as a new approach to old subjects should anticipate some difficulties:

Accommodation. In an overcrowded city school, the principal may not be able to spare a room for the laboratory and workshop. While there is no perfect solution to this difficulty, it can be suggested that a crafts room or an art room, if available, is reconditioned for the purpose.

Initial equipment. There should be no difficulty in securing initial equipment if teachers collect and classify all the material they have in the school.

Time factor. So long as projects are closely related to the school syllabus and the social and cultural activities periods are fully utilized, sufficient time will be found.

Funds. The term's fees will yield sufficient funds for extra-curricular programmes, and the average school budget will easily bear the cost of the laboratory and the workshop.

Assessment and evaluation. Twenty per cent of the marks given to an individual for the year's work should be allotted for the work done in the social studies laboratory.

Methodology. Freedom is the soul of methodology. Yet, if teachers find it helpful to make a preliminary acquaintance with new methods in social studies, a neighbouring training college can usually be relied upon for assistance.

C. N. PATWARDHAN

The Tabular Procedure in Mathematics

MATHEMATICS HAS ALWAYS HAD an important place in any good scheme of education. One of the important aims of teaching mathematics lies in developing a sense of orderliness in students. From this point of view *what* we teach is not quite as important as *how* we teach it. The teacher may be in full possession of his subject and yet lack adequate ability to get his knowledge across to the student. That is why so much emphasis is laid in teacher-training institutions upon methods of teaching various subjects. There are as many methods as there are teachers. Therefore teachers, in addition to resorting to traditional procedures, must also experiment with new procedures which may help children to learn more effectively.

Adding new topics

We have been busy reconstructing, or reorganizing, the mathematics curriculum with a view to including more and more topics of study. We have added taxes, commissions, stocks and shares, as these subjects have a greater utility in preparing children for their life as adults. Too much algebra and geometry and other kinds of abstraction may not help the average student who stops his education with the secondary school. Somehow or other we were quick

enough to include these new topics in the curriculum for mathematics, but in our enthusiasm and haste, neglected to discover the proper procedure for teaching them.

Method varies with matter

The age-old, step-by-step procedure, is ever ready to come to our help and rescue in solving problems in the topics referred to. We are accustomed to the use of this procedure in solving any problem, and automatically, with new topics, we begin to apply this same old method. Have we ever thought how employers generally, commission agents, and income-tax departments do their jobs? Here it is not matter alone that is important. How the people who are connected directly and more meaningfully with such matters tackle their problems is equally important. No income-tax department assesses tax by adopting the 'step-by-step' procedure. No commission agent calculates his commission in the traditional mathematics notebook. Our examples need not be limited to these two. Go anywhere in society and see how people solve problems that involve numbers. No practical man of the outside world resorts to classroom procedure. His method is as important as his material. We would be very much at fault if we included the one and excluded the other. No teacher wants to prepare his children for incomplete or fractional living, but the methods employed today by most teachers of mathematics tend to do this.

The Tabular Method

As senior mathematics assistant for some years in a high school in Madras State, I have tried the tabular procedure both with traditional topics, like ratio, and proportion and percentage, as well as with new topics, like income-tax or commission. The procedure is illustrated below by a number of examples based on the methods employed by people in everyday life for calculating wages, expenditure, income-tax, commission and so on. There is no necessity to explain why the 'step-by-step' procedure is not printed for comparison. Teachers are already too well acquainted with it.

Example 1: A Problem on RATIO

An individual travels by cart, train and bus to cover 56 miles. The distance he travels by each is in the ratio 2:7:5. The fares for each mile are in the ratio 16:2:3. If he is charged 3 naye paise per mile by bus, what is his total expenditure?

Particulars	Cart	Train	Bus	Remarks
Ratio of distance travelled by each ...	2	7	5	Total 14
Ratio of fares per mile ...	16	2	3	
Actual distance travelled by each* ...	2×56/14 =8	7×56/14 =28	5×56/14 =20	miles
Fare per mile* ...	16	2	3	nP
Total fare: (3)×(4)* ...	128	56	60	Total Rs 2·44

* Here the teacher should explain the steps.

Example 2: A Problem on PERCENTAGE

There are 50 measures of pure milk in a vessel. If we take away 10 measures and add the same quantity of water, what is the percentage of water in the mixture? If we repeat the same process with this mixture, what will be the percentage of water in the new mixture?

Particulars	Measure of			Percentage of water	Remarks
	milk	water	total		
Initially ...	50	...	50	0	
Remove 10 measures of milk and add 10 measures of water ...	—10	+10	50		
Milk and water in the mixture ...	40	10	50	20*	10 measures in the mixture is 20 per cent
Remove another 10 measures from this mixture and add 10 measures of water* (water alone or milk alone cannot be removed here) ...	$\frac{80\times10}{100}$ =8	$\frac{20\times10}{100}$ =2	10		
Balance in the vessel ...	32	8	40		
Add 10 measures of water alone ...	...	10	...		
Now water and milk in this new mixture ...	32	18	50	36*	

* Procedure may be simplified with practice.

Example 3: A Problem on COMMISSION

A commission agent gets 5 per cent a month on sales executed by him up to a limit of Rs 5,000. On the next Rs 2,000 he gets 8 per cent and on the next Rs 1,500 he gets 10 per cent. For any amount beyond that he gets 15 per cent commission. What will he get for sales totalling Rs 7,800, 5,400 and 9,200 in different months?

Particulars	Rs 5,000	Rs 7,000	Rs 8,500	Above this limit	Commission
Commission for the amounts given (in rupees) ...	250	410	560	+15 for every 100	...
Rs 7,800 by sales ...	...	...	$+\frac{800\times10}{100}$ =80	...	410+80 =Rs 490
Rs 5,400 by sales ...	...	$+\frac{400\times8}{100}$ =32	...	...	250+32 =Rs 282
Rs 9,200 by sales ...	...	...	...	$+\frac{700\times15}{100}$ =105	560+105 =Rs 665

Note:—Similar problems occur in income-tax and they can also be solved by such tabulation.

Example 4: A Problem on STOCKS AND SHARES

A shareholder sells his stock worth Rs 3,600 of 3 per cent shares for the market value of Rs 95 per share and buys 4½ per cent shares at Rs 114 from the amount realized. How has his income changed?

Kind of share	Stock	No. of shares	Market value	Amount got by sale	Income	Remarks
3%	Rs 3,600	36	95	Rs 3,420	Rs 108	In this transaction he lost 6 shares. We have proceeded backwards for the second step here.
4½%	Rs 3,000	30	114	„	Rs 135	
So his income has increased by Rs 27.						

Note:—More difficult examples may also be attempted here.

Benefits obtained

After adopting this tabular procedure I have discovered that learning is quicker and students commit fewer mistakes than is usual when using the traditional one. This tabular arrangement presents all the data much more clearly than the 'step-by-step' procedure does. Execution is very neat, and students can do more problems on the same model in one page of the notebook than is possible by the traditional procedure. There are several other advantages. Let every teacher experiment with this procedure and discover what they are.

It will be all the more purposeful, if we actually take students to income-tax offices, commission agents and share-brokers, to see how they do their work. Teachers are partly responsible for making mathematics dry and dull to learn. Mathematics has its own scope for outings, field projects, and visits generally.

The actual blank tabular sheets used by an income-tax office and commission agent must be acquired by the school not only for exhibition but also for their practical utility. Mathematics should be made easy and meaningful by providing children with conversion tables, ready-reckoners and blank forms, while teaching and testing them. Let us resolve to cover the dry bones of mathematics with flesh and blood.

A great mathematician once said that anything under the sun which involves numbers can be expressed in ' ratio and proportion '. We may add to this and say that any problem in mathematics may be solved by the tabular procedure. ' Tabulate and teach better.'

T. R. VENKATASUBRAHMANYAN

Land-Use Survey in Secondary Schools

IS IT POSSIBLE to relate secondary education to national planning? Can we make the secondary school student play a significant role in the planned development of the country's resources?

There can be little doubt that this is possible, even necessary. What we require are techniques that will link secondary education to the Five Year Plans, rendering educational activities an essential part of planning programmes, and, while furthering the pupil's education, will at the same time further the objectives of the Plans.

In this article, I shall consider one of these techniques: that of the land-use survey. As the term indicates, it is a survey to discover how the land is utilized by the people, the data being depicted on maps. Such surveys are of some urgency at the present moment, with the increasing pressure of population on the land and the growing food deficit.

The land is our most precious heritage, but our knowledge of land-use is very limited. This is true not only of the country as a whole but even of the smallest administrative unit, the *thana*. Records

may exist to show how much of the *thana* is being tilled and so on but, when it comes to more precise data, we usually draw a blank. We should like to know, for instance, why the marginal lands in the *thana*, lumped together in government statistics as 'other uncultivated lands', remain uncultivated. The answer is of crucial importance to the nation.

Land-Use Maps

For many years we have waged a grow-more-food campaign. We call it a campaign, although few seem to realize the difficulty of fighting a successful campaign without maps. The result, naturally, has been disappointing. By this, it is not implied by any means that the absence of land-use maps has been the sole reason for the slow progress in the extension of arable land, but it has been an important contributory factor. Without land-use maps, it is difficult to see where the extensions can be effected: but with them we can literally put our finger on the problem, for we have before us an accurate graphic record of how each piece of land is being utilized.

It must be conceded that no central agency can undertake at present the enormous task of producing such detailed maps for the whole of India. Therefore, the suggestion is made that secondary schools should try to do their bit for the country by producing land-use maps, at least for those areas which are near by. As a first step, they might consider the inclusion of land-use surveying as a topic of study in the senior school. While being a nation-building activity, it is also an exercise in discipline, and can be made to form an integral part of subjects such as social studies and geography.

However, some may contend that school-children are scarcely the people to unearth factual data for national planning. To this we may answer that high school students, supervised by a qualified teacher, are far better agents for this than the poorly paid functionaries of the revenue department, on whose returns much of the statistical data of the Government of India are based. In fact there is nothing very original in the suggestion that schools should undertake land surveys, for under enterprising teachers school-children have carried out occasional detailed local surveys. But that such surveys should now be undertaken not merely as an academic exercise but as an aid to national planning is a new concept. It involves seriousness of purpose, and accuracy of execution, and the adoption of standard procedure and method is also necessary to render the results of school land-use surveys acceptable to the planning expert.

Briefly, the *modus operandi* of a land-use survey consists in going out into the field with sufficiently detailed large-scale maps and

recording on them, in accordance with an accepted system of land-use classification, the way in which the land is being utilized then, after an independent check for accuracy, transferring this data in colour to maps of a smaller scale so that the land-use pattern over a fairly large area can be seen at a glance. So, before the survey can be undertaken, we must have a sufficient number of maps of the appropriate scales, and there must be a suitable system of land-use classification which the students can be trained to recognize in the field.

Preparing the Maps

For the summarized data, the most suitable maps are those on a scale of one inch to a mile. Some would consider this too large a scale, for to cover the whole of India by means of one-inch land-use maps would indeed be a colossal task. But we are here concerned with only a limited area in the neighbourhood of the school, and data on maps of a smaller scale would not show sufficient detail for land-use planning. Fortunately, one-inch maps are available for the greater part of India, and these can be purchased from the Survey of India, Wood Street, Calcutta (schools are allowed a discount), and adapted for our purpose.

For field work, the maps should be of a sufficiently large scale to show all the important land features and the larger individual land properties. Maps on a scale of three inches to a mile should prove adequate but, as there are no published maps on this scale (except for a few cities) or anywhere near it, their preparation is likely to prove the greatest initial obstacle to the commencement of a land-use survey programme. One way to overcome it is to enlarge the relevant portions of one-inch sheets to three times their size by hand or, where facilities are available, photographically or by means of a pantograph. The details of field boundaries will have to be sketched in after reference to the large-scale revenue maps maintained by the revenue authorities. Copies (since a number of copies of each map will be required for field work) may be prepared either photostatically or by the blue-print method, or simply by using carbon paper. Where the blue-print method is employed, the background of the map must be white, not blue.

Land-Use Classification

The utility of a land-use map depends on the system of land-use classification. And whatever system we adopt, it must be simple, flexible, completely objective, easy to recognize and easy to depict on a map. Uniformity is another very desirable quality. All secondary schools in India should adopt the same classification.

Officially, annual statistics are collected on land-use throughout India under five categories: Forests, Not available for Cultivation, Other Uncultivated Land, Current Fallow, and Net Area Sown. But this is inadequate classification. Besides, there seems to be some confusion among the states as to its precise meaning. A classification which is likely to be accepted throughout the world, is the one drawn up by the World Land-Use Survey Organization, meant mainly for maps on the scale of 1:1,000,000. It is sufficiently comprehensive without being complicated, and it can be adapted to meet the requirements of maps of a much larger scale; so we cannot do better than work within its framework, introducing such modifications as local conditions demand. The categories are:

Description	*Colour*	*Letter Markings*
1. (*a*) Settlements and	Dark Red	S
(*b*) Associated non-agricultural lands	Light Red	SA
2. Horticulture	Deep Purple	H
3. Trees and other perennial crops	Light Purple	T
4. Crop-lands		
(*a*) Continual and rotation cropping	Dark Brown	C
(*b*) Land rotation	Light Brown	CR
5. Improved permanent pasture (managed or enclosed)	Light Green	P
6. Unimproved grazing land		
(*a*) Used	Orange	G
(*b*) Not used	Yellow	GN
7. Woodlands		
(*a*) Dense	Dark Green	WD
(*b*) Open	Medium Green	WO
(*c*) Scrub	Olive Green	WK
(*d*) Swamp forests	Blue Green	WL
(*e*) Cut over or burnt over forest area	Green Stipple	WB
(*f*) Forests with subsidiary cultivation	Green with Brown Dots	WF
8. Swamps and Marshes (fresh and salt water, non-forested)	Blue	M
9. Unproductive land	Grey	X

1. (*a*) *Settlements—Dark Red:* Land covered by roads and buildings of any kind should be included in this category.
   (*b*) *Associated non-agricultural lands—Light Red:* These include land rendered agriculturally unproductive through human use, e.g. waste heaps, railway sidings, quarries and mines, cemeteries.
2. *Horticulture—Deep Purple:* Land used for the cultivation of vegetables and garden fruits come under this heading. But land on which vegetables are grown in rotation with ordinary farm crops should be classified under category 4.
3. *Trees and other perennial crops—Light Purple:* This category should include all plantation crops, e.g. tea, coffee, rubber, as well as coconut groves, orchards, teak plantations, etc.
4. (*a*) *Continual and rotation cropping—Dark Brown:* By continual cropping is meant the cultivation of the same crop year after year on the same land as in the case of rice and sugar. In rotation cropping, different crops are grown in rotation to preserve soil fertility or to meet market requirements. Under this category is included current fallows, that is, land which is rested for a short period, not exceeding three years.
   (*b*) *Land rotation—Light Brown:* Where cultivation is intermittent, that is, a period of cultivation followed by a long period of fallow, the land should be coloured light brown for actual cultivation, and with light brown stipples for fallow.
5. *Improved permanent pasture—Light Green:* This includes enclosed fields where special quality grass is grown for controlled grazing, not very common in India.
6. *Unimproved grazing land—Orange and Yellow:* Under this category come extensive areas of grassland, which, owing to thin soil, scanty rainfall, or for some other reason, has not been brought under the plough. A distinction is made between grassland used for grazing (orange) and not used for grazing (yellow).
7. *Woodlands* (*a*) *Dense—Dark Green:* Mostly equatorial forests where the crowns of the trees touch.
   (*b*) *Open—Medium Green:* Land commonly referred to as jungle where the crowns of the trees do not touch and there is a good deal of undergrowth.
   (*c*) *Scrub—Olive Green:* Arid land with desert plants.

(*d*) *Swamp forests—Blue Green:* Land near fresh and salt water lakes covered with mangroves, screw pines, etc.

(*e*) *Cut over or burnt over forest area, not yet fully reclothed —Green Stipple.*

(*f*) *Forests with subsidiary cultivation—Green with Brown Dots:* Forests where cultivation is carried on as a subsidiary activity.

8. *Swamps and Marshes (non-forested)—Blue.*
9. *Unproductive land—Grey:* Under this category should be placed all essentially unproductive land, e.g. barren mountains, rocky and sandy forests.

Field Work

Once provision is made for an adequate number of maps of the appropriate scales and a system of land-use classification is accepted, the survey can be completed in a matter of days. But it would be advisable to precede the survey work with a short course in map-reading and with sufficient exercises in the field to distinguish between the various types of land-use. The students may then be entrusted with three-inch maps of the area with which they are familiar. All they have to do is to write down on the map the appropriate 'letter marking' for each piece of land. They may also be encouraged to keep a notebook and to jot down any land-use feature that strikes them as significant.

On return to the classroom, they should paint on the map the colours corresponding to the letter marking. The next step is to check the maps for accuracy. One method is to let two students make independent surveys of the same area; another is to match adjoining maps for agreement to see if, for instance, a field extending over two maps is marked in the same colour. A final step is for the teacher in charge of the survey to make traverses, that is, go in random directions across the region while checking the accuracy of the maps. The data should then be transferred from three-inch maps to a one-inch map, after making the corresponding reduction in size. The result is an original and accurate document, the significance of which will increase with the years.

The educative value of a land-use survey is evident. It is not a single isolated activity but the beginning of a series of interconnected activities bringing the students into intimate contact with their environment. They see in what manner land was utilized by their predecessors, for a land-use survey is not just a survey of vegetation and agricultural activities but a survey of the sum total of human effort that has left its imprint on the land.

K. V. W. DHARAN

Book Reviews

KENNETH ROBINSON: *English Teaching in South-East Asia* (Evans, 1960), Demy 8vo, pp. 272, 15*s*.

This book is meant essentially for teachers in training, but it will also be of considerable value to all who teach English as a foreign language. Although it deals with the teaching of English in South-East Asia, our problems in India in this respect are very similar.

The author does not believe in a 'system'. He exhorts teachers of English not to be slaves to a particular method. He would rather deal with the principles of teaching a foreign language.

The book has two main sections. The first seven chapters are devoted to the 'why' of language teaching and what English teaching means. Some of the points emphasized are: the background to languages in general, some important differences between English and the languages of South-East Asia, and what constitutes a good English course. These valuable discussions are based on the author's own experiences in China, Sarawak and Singapore.

The second part of the book is likely to be of greater practical use, both to the experienced teacher of English as well as to the trainee. It deals with concrete suggestions for the presentation of a lesson, the ways and means by which it can be made interesting, and the use of visual aids.

The approach to the question of grammar is rational. Functional grammar, sentence patterns, word positions and functions occupy an important place. The author feels that it is possible to learn a language without being conscious of the rules of grammar. Nevertheless the chapter on functional grammar gives an exhaustive account of when grammar rules should be taught and how they can develop the habit of clear thinking.

The chapter on the correction of pupils' work discusses common mistakes and gives practical suggestions for dealing with these mistakes. The author contends that not all mistakes are equally serious, so the teacher must learn to differentiate between fundamental errors and errors of style.

At the end of each chapter is a series of exercises and questions which will prove most useful.

* * *

MOLLY HARRISON and O. M. ROYSTON: *Picture Source Book for Social History — Late Nineteenth Century* (Allen & Unwin, 1961), Demy 8vo, pp. 140, 12*s*. 6*d*.

This is the fourth of a series of books on English social history of the late nineteenth century, written for the senior student.

The approach is rather unusual in so far that half the book is made up of pictures of which some are reproductions of photographs and paintings and some are original drawings. The other half consists of material which is reproduced from books written before 1900, and from the work of contemporary authors who write about their youth in the late nineteenth century.

The material in both sections is presented in a pleasing manner. The pictures are of interest to the adult and to the pupil. They cover a wide range of topics relating to social and industrial life in England. They deal, for example, with institutions that prevailed at the time: the fish market of 1870 lit by gas jets; Charing Cross Station with the hansom cab and the hackney carriage; a typical classroom in a school; a summer's day in Hyde Park; slums in 1899; officers' uniforms, and a variety of other subjects.

The extracts which occupy the second half of the book relate to the pictures in the first half. They make fascinating reading and the selection is carefully made.

The Victorian age, which is now thought of as stuffy, prim, and dull, was full of adventure. The revolution in ideas and beliefs was rapid. It was an age of expansion for the British Empire, a golden era for trade, industry, and science. It was also an age of social differences, so that Disraeli spoke of England as being two nations. As the pictures illustrate, the living conditions of the poor were dreadful. Many philanthropists, statesmen and writers were deeply concerned with this and much was written.

The extracts in this book are taken from contemporary writings, and considerable variety has been introduced by passages taken from newspapers and journals such as *Punch*. For example, a dialogue between a teacher and a pupil throws light on the prevailing educational system. A description of how crinolines were the cause of many accidents, a list of the fourteen articles of clothing that a young lady wore, and the daily routine of a middle-class household—all add to the book's value.

This is not a 'story book', but it reads like one. It is essentially a book of reference, and the index, which is always an important part of a reference book, has been placed at the beginning.

No student would find social history dull if it were presented in this manner.

FRED J. SCHONELL: *The Psychology and Teaching of Reading* (Oliver & Boyd, 1961), Demy 8vo, pp. 296, 15*s*.

This book is an excellent example of the continued interest shown in the provision of suitable material for the young. Mr Schonell is a veteran in the educational field. His book has undergone considerable change in the past fifteen years and a third edition is now published.

The author has much to say on what is likely to awaken interest in the child. He is as much on his guard against talking down to the child as he is against presenting him with material which is beyond his comprehension. What is interesting is the manner in which he demonstrates how the apparently simple may really be very confusing in practice. He illustrates his points with examples which, with very little effort, can be tested by the reader himself.

The scope of the author's study may be judged by the fact that he covers the whole field from the comparative merits of the phonic system, the whole word and the sentence systems, to the attraction of comics, the proper selection of type for various degrees of reading skills, and the choice of books. At the present stage of India's educational development, this book offers to our educationists a good deal of sound commonsense.

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